CLAIMS:

1. A method of perfusion imaging comprising:

- performing a first magnetic resonance data acquisition (A) with gradient encodings for random motion at a first sensitivity (b) value,
- performing a set of at least six second magnetic resonance data acquisitions (B_1, B_2, ... B_6) with gradient encodings for random motion in different directions at second sensitivity (b) values,
- determining a perfusion tensor based on the magnetic resonance data acquisitions.

2. The method of perfusion imaging of claim 1, the second sensitivity values being below 50 s/mm^2 and the first sensitivity value being substantially smaller than the second sensitivity values.

3. The method of perfusion imaging of claim 1 or 2, whereby the first sensitivity value is substantially zero and the second sensitivity values being between five and thirty, preferably ten.

4. The method of perfusion imaging of claims 1, 2 or 3, the magnetic resonance data acquisitions being performed by means of a series of single-shot echo-planar magnetic resonance data acquisitions.

5. The method of perfusion imaging of any one of the preceding claims 1 to 4, further comprising performing a perfusion tensor visualisation step.

6. The method of perfusion imaging of claim 5, whereby directional information derived from the perfusion tensor is visualized.

7. The method of perfusion imaging of any one of the preceding claims 1 to 6, further comprising determining of first slope values (m_1, m_2,...m_6) between each one of the

set of magnetic resonance data acquisitions (B_1, B_2, ... B_6) and the first magnetic resonance data acquisition (A), and determining the perfusion tensor based on the first slope values.

8. The method of perfusion imaging of any one of the preceding claims 1 to 7, further comprising:

- performing of a third magnetic resonance data acquisition (X) at a third sensitivity (b) value,
- performing of a fourth magnetic resonance data acquisition (Y) at a fourth sensitivity (b) value, the third sensitivity value being substantially higher than the second sensitivity values, and the fourth sensitivity value being substantially higher than the third sensitivity value,
- determining of a diffusion coefficient (D) and a fraction value (f) based on the third and the fourth magnetic resonance data acquisitions to provide a diffusion signal component,
- eliminating of the diffusion signal component from the magnetic resonance data acquisitions to provide a perfusion signal component,
- determining of a perfusion tensor from the perfusion signal components.

9. The method of perfusion imaging of claim 8, whereby a set of at least six third magnetic resonance data acquisitions with gradient encodings for random motion in different directions at third sensitivity (b) values is performed, and a set of at least six fourth magnetic resonance data acquisitions with gradient encodings for random motion in different directions at fourth sensitivity (b) values is performed, and the diffusion tensor tensor is determined based on the third and the fourth magnetic resonance data acquisitions to provide a diffusion signal component.

10. The method of perfusion imaging of claim 8 or 9, the third sensitivity value being between 100 and 400, and the second sensitivity value being between 600 and 1200.

11. The method of perfusion imaging of any one of the preceding claims 1 to 7, further comprising:

- selecting one of the second magnetic resonance data acquisitions (B_1, B_2, ... B_6) having the strongest measured signal decay,
- performing a third magnetic resonance data acquisition (Y) at a third sensitivity (b) value, the third sensitivity value being substantially higher than the second sensitivity values,

- determining of a diffusion coefficient (D) and a fraction value (f) based on the selected second and third magnetic resonance data acquisitions to provide a diffusion signal component,
- eliminating the diffusion signal component from the magnetic resonance data acquisitions to provide a perfusion signal component,
- determining of a perfusion tensor from the perfusion signal components.

12. A computer program product, in particular digital storage medium, for perfusion imaging comprising program means for determining a perfusion tensor based on a first magnetic resonance data acquisition (A) and a set of at least six second magnetic resonance data acquisitions (B_1, B_2, ... B_6), the first magnetic resonance data acquisition being performed at a first sensitivity value and the second magnetic data resonance data acquisitions being performed at a second sensitivity value with gradient encodings in different directions, whereby the first sensitivity value is substantially below the second sensitivity values, and for performing a perfusion tensor imaging step.

13. The computer program product of claim 12, the program means being adapted to determine of first slope values (m_1, m_2,...m_6) for each one of the second magnetic resonance data acquisitions (B_1, B_2, ... B_6) based on the first magnetic resonance data acquisition (A) and to determine the perfusion tensor based on the first slope values.

14. The computer program product of claims 12 or 13, the program means being adapted to determine a diffusion coefficient (D) and a fraction value (f) based on third (X) and fourth (Y) magnetic resonance data acquisitions to provide a diffusion signal component, to eliminate the diffusion signal component from the magnetic resonance data acquisitions to provide a perfusion signal component, and to determine a perfusion tensor from the perfusion signal component.

15. The computer program product of claim of claim 14, the program means being adapted to process a set of at least six third magnetic resonance data acquisitions with gradient encodings for random motion in different directions at third sensitivity (b) values, a set of at least six fourth magnetic resonance data acquisitions with gradient encodings for random motion in different directions at fourth sensitivity (b) values, and to determine the

diffusion tensor based on the third and the fourth magnetic resonance data acquisitions to provide a diffusion signal component.

16. The computer program product of claims 12 or 13, the program means being adapted to select one of the second magnetic resonance data acquisitions (B_1, B_2, ... B_6) having the highest data value, determining of a diffusion coefficient (D) and a fraction value (f) based on the selected second magnetic resonance data acquisition and a third magnetic resonance data acquisition (Y) being performed at a third sensitivity value, the third sensitivity value being substantially above the second sensitivity values, providing a diffusion signal component based on the diffusion coefficient and the blood fraction value, eliminating of the diffusion signal component from the magnetic resonance data acquisitions to provide a perfusion signal component, and to determine of a perfusion tensor from the perfusion signal components..

17. A perfusion imaging apparatus comprising:

- means (402, 404, 406, 408) for performing a first magnetic resonance data acquisition (A) at a first sensitivity (b) value and for performing a set of at least six second magnetic resonance data acquisitions (B_1, B_2, ... B_6) with gradient encodings in different directions at second sensitivity (b) values,
- means (410, 412) for determining a perfusion tensor based on the magnetic resonance data acquisitions,
- means (414, 416, 418) for performing perfusion tensor imaging.